Claims

1. A method for providing real-time broadcast service in a mobile communication network, comprising:

A. linking real-time broadcast service to the mobile communication network; and

B. adding a broadcast service hierarchy for specially providing real-time broadcast service in an radio access network having an original service hierarchy for providing voice communication; real-time broadcasting the real-time broadcast service to mobile terminals via air interface of the mobile communication network through setting special broadcast resources; the mobile terminal working in either of an original service hierarchy mode and a broadcasting service hierarchy mode which can be switched with each other.

2. The method for providing real-time broadcast service in a mobile communication network according to claim 1, step A comprising: transmitting the content information of real-time broadcast service to an information transmitting server; then accessing the content information of real-time broadcast service to the mobile communication network by the information transmitting server.

3. The method for providing real-time broadcast service in a mobile communication network according to claim 1, under the condition that special carrier resources are adopted as special broadcast resources, step B further comprising: setting only independent down link carrier frequency in the added broadcast service hierarchy for specially providing real-time broadcast service; dividing the broadcast service hierarchy into cells where adjacent cells employ different scrambling codes and defining multiple cells into one location area; under the broadcast service hierarchy mode, the mobile terminal staying in the cell of broadcast service hierarchy, solely controlling the cell handoff when the terminal moves among cells, and monitoring the paging procedure.

4. The method for providing real-time broadcast service in a mobile communication network according to claim 3, further comprising: setting broadcast channel for broadcasting corresponding cell information and paging channel for paging mobile terminals under the broadcast service hierarchy mode in the cell of broadcast service hierarchy.

5. The method for providing real-time broadcast service in a mobile communication network according to claim 4, wherein said cell information includes location area code

and paging channel configuration information of the cell in broadcast service hierarchy, and the frequencies, scrambling codes, Random Access Channel (RACH), AICH public channel relating to RACH and Forward Access Channel (FACH) of the adjacent cells in the original service hierarchy.

6. The method for providing real-time broadcast service in a mobile communication network according to claim 3, wherein the scrambling codes in the broadcast service hierarchy and those in the original service hierarchy are either the same or different; the location division for cells of the broadcast service hierarchy and that for cells of the original service hierarchy is either superposed or not.

7. The method for providing real-time broadcast service in a mobile communication network according to claim 3, wherein the cell handoff includes location update which is triggered when the mode of mobile terminal is switched between the broadcast service hierarchy mode and the original service hierarchy mode, and when location area changes under the broadcast service hierarchy mode.

8. The method for providing real-time broadcast service in a mobile communication network according to claim 7, wherein the step of triggering location update when location area changes under the broadcast service hierarchy mode comprises: the mobile terminal obtaining information about the cell in the original service hierarchy, which is adjacent to the current cell in the broadcast service hierarchy, from the broadcast information in broadcast channel in the broadcast service hierarchy, finding a cell in the original service hierarchy where the terminal can stay, and sending a random access request utilizing the Random Access Channel (RACH) in the cell of the original service hierarchy; after receiving the AICH information from the cell of the original service hierarchy, the mobile terminal tuning the receiving frequency to the down-link carrier frequency, starting the search and synchronization for the current cell of the broadcast service hierarchy, meanwhile sending a message containing location update information to the network utilizing the up-link carrier frequency in the original service hierarchy, and waiting to receive location update confirming message at the cell of the current broadcast service hierarchy.

9. The method for providing real-time broadcast service in a mobile communication network according to claim 3, wherein the step of monitoring the paging channel under the broadcast service hierarchy mode is the same as that under the original service

hierarchy mode, comprising: the network selecting a cell in corresponding location area according to the received location information of the mobile terminal, and sending down-link paging information according to broadcast service carrier frequency or original service carrier frequency, respectively corresponding to the broadcast service mode or the original service mode.

10. The method for providing real-time broadcast service in a mobile communication network according to claim 3, under the condition that special carrier resources are adopted as special broadcast resources, further comprising: the mobile terminal switching the mode from the broadcast service hierarchy mode to the original service hierarchy mode, making a reply or initiating a call through the original service hierarchy.

11. The method for providing real-time broadcast service in a mobile communication network according to claim 10, wherein the step of the mobile terminal making a reply or initiating a call through the original service hierarchy further comprises: sending information about the adjacent cells in the original service hierarchy by the broadcast service hierarchy utilizing the broadcast channel.

12. The method for providing real-time broadcast service in a mobile communication network according to claim 3, wherein the mobile terminal shares one set of receiving system and synchronizing system under the broadcast service hierarchy mode and the original service hierarchy mode.

13. The method for providing real-time broadcast service in a mobile communication network according to claim 3, wherein the mobile terminal utilizes respective receiving systems and shares one set of synchronizing system under the broadcast service hierarchy mode and the original service hierarchy mode.

14. The method for providing real-time broadcast service in a mobile communication network according to claim 1, under the condition that special scrambling code resources are adopted as special broadcast resources, step B further comprising: setting independent down link special scrambling codes in the added broadcast service hierarchy for specially providing real-time broadcast service; wherein the locations of cells of the broadcast service hierarchy and those of the original service hierarchy are superposed so as to form the structure of the cell of the original service hierarchy plus the cell of the broadcast service hierarchy, and each cell utilizes the same special down link scrambling code and

the same special broadcast channel code for transmitting only real-time broadcast information; said down link special scrambling codes for real-time broadcast service are added only in macro cells but micro cells or pico cells; the working mode of mobile terminal keeps unchanged for the original service, pilot channel of the original cell is shared and real-time broadcast service is supported under both idling mode and connecting mode.

15. The method for providing real-time broadcast service in a mobile communication network according to claim 14, wherein the step of setting independent down link special scrambling codes in the broadcast service hierarchy is performed through adding a scrambling operation with the down link special scrambling codes in the base station sender of each cell in the original service macro cell covering hierarchy; the information of the broadcast service hierarchy and that of the original service hierarchy either share the same power amplifier or utilizes respective power amplifiers.

16. The method for providing real-time broadcast service in a mobile communication network according to claim 15, wherein processing of the sender includes modulation and spectrum spreading for original service and that for real-time broadcast service; the modulation and spectrum spreading for original service includes source encoding, channel encoding, Quaternary Phrase-Shift Keying (QPSK), spectrum spreading and scrambling the spectrum spread results utilizing the down-link scrambling codes of each cell for the original service; the modulation and spectrum spreading for real-time broadcast service includes source encoding, channel encoding, QPSK, spectrum spreading and scrambling the spectrum spread results utilizing the down-link special scrambling codes for the real-time broadcast service.

17. The method for providing real-time broadcast service in a mobile communication network according to claim 14, wherein the demodulation unit of RAKE receiver of the mobile terminal adopts down-link special scrambling codes for specially receiving real-time broadcast service; channel decoding and source decoding is implemented respectively for the original service and real-time broadcast service after the signals pass the RAKE receiver; the channel code of RAKE receiver is the special broadcast channel code, namely down-link special scrambling code.

18. The method for providing real-time broadcast service in a mobile communication network according to claim 14, wherein said structure of the cell of the original service

hierarchy plus the cell of the broadcast service hierarchy is that range and location division of the cell of the original service hierarchy plus broadcast service hierarchy is the same as that of the macro cell of the original service hierarchy.

19. The method for providing real-time broadcast service in a mobile communication network according to claim 14, wherein the mobile terminal supports real-time broadcast service under both idle mode and connecting mode, the method further comprising: keeping the mobile terminal under idle mode for the original service when the mode of the mobile terminal is switched to broadcast mode from idle mode; when the mobile terminal is located in a macro cell, according to the channel estimation result for the public pilot frequency of this cell and the channel estimation result for the public pilot frequency of one or multiple adjacent cells with powerful signals, merging the received signals of multi cells and demodulating the signals on special broadcast channel; the mobile terminal selecting and reselecting cells, implementing location update and receiving paging information in terms of the process of original service; when the mobile terminal is located in a micro cell or a pico cell, according to the channel estimation result for the public pilot frequency of one or multiple adjacent cells with powerful signals, merging the received signals of multi cells and demodulating the signals on special broadcast channel; the mobile terminal selecting and reselecting cells, implementing location update and receiving paging information in terms of the process of original service.

20. The method for providing real-time broadcast service in a mobile communication network according to claim 14, further comprising: the mobile terminal evaluating the interference value from the added down-link special scrambling codes to service channels through the demodulated special broadcast channel data and the known information about channel transmission condition, scrambling code and channel code, and subtracting this interference value from the received signal.